



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/892,417	06/27/2001	Wim Hupkes	TS-1027 (US)	2792

7590

01/04/2005

Beverlee G. Steinberg
Shell Oil Company
Intellectual Property
P. O. Box 2463
Houston, TX 77252-2463

EXAMINER

FERRIS III, FRED O

ART UNIT

PAPER NUMBER

2128

DATE MAILED: 01/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/892,417

Applicant(s)

HUPKES ET AL.

Examiner

Fred Ferris

Art Unit

2128

-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>8/31/01</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. *Claims 1-16 have been presented for examination based on applicant's disclosure filed on 27 June 2001. Claims 1-16 have been rejected by the examiner.*

Priority

2. *Applicant's claim for foreign priority based on provisional application number EPC 00306148.8 filed 19 July 2000 is acknowledged. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.*

Drawings

3. *The subject matter of this application admits of illustration by a drawing to facilitate understanding of the invention. Applicant is required to furnish a drawing under 37 CFR 1.81. No new matter may be introduced in the required drawing. In particular, the reduced uncertainty area related to the dynamic transfer functions, the time period corresponding to min/max deadtime, and deviation (prediction error) should be illustrated.*

Specification

4. *The abstract of the disclosure is objected to because it exceeds more than 150 words in length. The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words.*

Art Unit: 2128

Applicant is reminded of the proper content and format of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:

- (1) if a machine or apparatus, its organization and operation;
- (2) if an article, its method of making;
- (3) if a chemical compound, its identity and use;
- (4) if a mixture, its ingredients;
- (5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. *The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.*

*Specifically, independent claim 1, recites limitations relating to on-line calibration of process models by processing prediction through two independent dynamic transfer functions, and calculating the deviation, that has not been sufficiently disclosed in the specification. While the specification makes reference in very general terms to “applying two independent dynamic transfer functions (page 4, line 24), and calculating the deviation (page 5, line 15), there is no sufficient teaching that would allow a skilled artisan to realize the claimed limitations from the description given in the specification. There are no specific methods, techniques, or models disclosed for actually processing prediction through two independent dynamic transfer functions or calculating the deviation, **as specifically applied to the calibration process of the claimed invention**, sufficient to allow one skilled in the art to make and use the claimed subject matter without undue experimentation. The additional passages recited at page 6, lines 1-23 do not cure this deficiency. Further, no flow charts or figures have been provided*

which demonstrate the steps of the claimed on-line calibration of process models. The examiner therefore submits that the specification does not provide a clear and concise description of the subject matter claimed in independent claim 1.

Dependent claims 2-16 inherit the deficiency of the claims from which they depend.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. *Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.*

Per independent claim 1: Independent claim 1 recites limitations relating to the step of processing data collected through a mathematical model that renders the claim indefinite. MPEP 2171 requires the following:

2171 Two Separate Requirements for Claims Under 35 U.S.C. 112, Second Paragraph

The second paragraph of 35 U.S.C. 112 is directed to requirements for the claims:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

There are two separate requirements set forth in this paragraph:

- (A) the claims must set forth the subject matter that applicants regard as their invention; and*
- (B) the claims must particularly point out and **distinctly define the metes and bounds of the subject matter that will be protected by the patent grant.***

In this case, the limitation relating to processing data collected through a mathematical model is vague and makes it impossible for one skilled in the art to

*establish the metes and bounds of the claim. While the specification makes reference to numerous models suitable for use in QE (page 4, lines 11-19), the language of independent claim 1 fails to point out specifically what is **included** or **excluded** in mathematical model or define how the mathematical model is applied to collected data. Can any mathematical model be applied to achieve the claimed processing of collected data? The examiner therefore submits that one skilled in the art would be at odds to determine the metes and bounds of the claimed processing data collected through a mathematical model from the language of independent claim 1.*

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 1-7 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-7 of copending Application No. 10/333446.

Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1-7 of the present invention are nearly identical verse and equivalent in function to claims 1-7 of copending Application No. 10/333,446. The examiner notes that applicant's amendment to claim 1 of application no. 10/333,446 filed on 1 November 2004 included the following minor changes to the claim wording. In steps b and e the word "process" (quality) was added, and in step e the word "value" (minimum), and the term "the absolute minimum value and maximum" (value) was added. The claims as originally filed in application No. 10/333,446 were previously identical to claims 1-7 of the present invention.

The examiner therefore asserts that it would have been obvious to a skilled artisan to include these minor changes to the claim wording for the following reasons. First, since the limitation of steps b and e recite a process model, the obtained prediction would obviously be a process quality prediction. Second, since the limitation of step e is also referring to "the absolute minimum and maximum values" of the intermediate signals, the minimum value is obviously the value of interest and "the absolute minimum and maximum values" would be understood, by a skilled artisan, to be the values defining the minimum and maximum prediction.

The examiner further asserts that these terms are merely obvious clarifications to the claim language, and do not change the scope or bounds of the claim. Hence, the claimed limitations of claims 1-7 in application No. 10/333,446 remain functionally equivalent to claims 1-7 of the present invention.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Interpretation

8. *While the specification for the claimed invention is deficient in the areas cited above under 112(1) and 112(2) rejections, the examiner has made prior art rejections based on the limited scope of information contained in the specification and a good faith attempt at interpreting the language of the claims. The examiner has therefore interpreted the elements of the claimed limitations of the present invention to be functionally equivalent to the prior art as noted below under 103(a) rejections.*

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

Art Unit: 2128

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,532,428 issued to Toprac in view of U.S. Patent 5,884,685 issued to Umezawa et al in further view of U.S. Patent 6,487,459 issued to Martin et al.

Regarding independent claim 1: Toprac teaches a system capable of automatic calibration of process models inclusive of collecting process data and measurement data and computing deviation by mathematical modeling. (Abstract, Summary, Figs. 2, 5-7) Toprac discloses the elements of the claimed limitations of the present invention as follows:

- automatic calibration of process models: (Abstract, CL2-L29-46, Fig. 2)
- collecting raw process data: (CL2-L29-46, CL3-L23-55, 63, Fig. 4 (410))
- processing data through a mathematical model: (CL6-L42-65, CL7-L5-27, Fig. 4)
- calculating deviation as difference between real & validated measurement and min/max prediction area: (CL7-L17, 44-47, Fig. 4)
- proceeding if absolute value of deviation is zero/larger: (CL7-L44-47, Fig. 4 – this step is also obvious as it merely determines the deviation boundaries)
- incorporating deviation into process model: (CL7-L44-45, Fig. 4)
- repeating: This step is obvious and necessary in order to process subsequent values.

Toprac does not explicitly disclose on-line real-time prediction of process quality.

Umezawa teaches a system capable of on-line prediction of real-time process quality inclusive of collecting process data and processing via mathematical model.

(Abstract, Summary of Invention, CL1-L9-10, CL2-L36, Figs. 7B, 8) Umezawa discloses the elements of the claimed limitations of the present invention as follows:

- on-line real-time prediction of process quality: Umezawa discloses on-line (CL2-L37) real-time (CL7-L21, 43) prediction (CL5-L41) of process quality (CL1-L9-10)*
- retrieving at time of absolute min/max prediction value real/validated: (CL12-L50, CL13-L56 to CL14-L7, Fig. 8) this step is also obvious as it merely determines the measured time prediction, i.e. deadtime, boundaries)*

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Toprac relating to automatic calibration of process models, with the teachings of Umezawa relating to on-line prediction of real-time process quality, to realize the claimed invention. An obvious motivation exists since, as referenced in the prior art, traditional analysis methods lack the speed and high accuracy prediction results that are available through on-line prediction (See Umezawa, CL2-L15-21). Accordingly, a skilled having access to the teachings of Toprac and Umezawa, would have knowingly modified the teachings of Toprac with the teachings of Umezawa, in order to provide on-line prediction of process quality with improved speed and higher accuracy to the calibration process.

Toprac and Umezawa further do not explicitly teach prediction using independent dynamic transfer functions and stored intermediate signal values.

Martin discloses modeling of multiple dynamic processes using dynamic transfer functions and stored signal values. (Abstract, Summary, Figs. 6, 7, 17, 19)

- prediction through two independent dynamic transfer functions: Martin discloses using multiple discrete (independent) dynamic transfer function in model prediction (CL5-L39-40, CL3-L5-13, CL6-L29-39, Fig. 2). The use of two independent functions would have been obvious in order to accommodate multiple mathematical models disclosed by Martin (CL6-L15-27). These models as known in the art as indicated by applicants (specification page 4, line 18).

- storing two intermediate (transfer) signals as function of time: (CL3-L11, CL5-L34, 60, Fig. 1)

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to further modify the teachings of Toprac and Umezawa, with the teachings of Martin relating to the use of dynamic transfer functions, to realize the claimed invention. An obvious motivation exists since this area of technology is highly competitive with many process calibration products available in the market place and large amounts of money being spent in product development and improvement (See Gemperline, pp. 2, 22). Accordingly, a skilled artisan would have made an effort to become aware of what capabilities had already been developed in the market place, and having access to the teachings of Toprac and Umezawa (as noted above), would

have knowingly further modified the teachings of Toprac and Umezawa with the teachings of Martin, in order to reduce development time and cost.

Per dependent claim 2: Claims 2 relates to the use of linear regression in the claimed mathematical model. As admitted by applicants on page 4, lines 11-19 of the specification, these models are known to those skilled in the art, and hence would have been knowingly selected as obvious choice for incorporation into the prediction model.

Per dependent claim 3: Claims 3 relates to the use of a linear dynamic model in the claimed mathematical model. As admitted by applicants on page 4, lines 11-19 of the specification, these models are known to those skilled in the art, and hence would have been knowingly selected as obvious choice for incorporation into the prediction model.

Per dependent claim 4: Claim 4 relates to the use of radial basis functions in the claimed mathematical model. As admitted by applicants on page 4, lines 11-19 of the specification, these models are known to those skilled in the art, and hence would have been knowingly selected as obvious choice for incorporation into the prediction model.

Per dependent claim 5-8: These claims depend from claims 1-4 respectively and merely require incorporating the deviation computed by the linear regression, linear dynamic, and radial basis function mathematical models (see above) into the prediction model. As also noted above, Toprac discloses incorporating the deviation value into the prediction model (CL7-L44-45, Fig. 4) and hence would have been knowingly incorporated by a skilled artisan using the reasoning previously cited above.

Per dependent claims 9-12: Claims 9-12 depend from claims 1-4 respectively and are directed to the use of Kalman filter methods in incorporating the deviation into the prediction model. As admitted by applicants on page 6, line 6 of the specification, the use of Kalman filter methods is well known to those skilled in the art, and hence would have been knowingly selected as obvious choice for incorporation into the prediction model. As previously noted, Toprac discloses incorporating the deviation value into the prediction model (CL7-L44-45, Fig. 4). Umezawa discloses on-line automatic (self) learning on the basis of prediction information (CL13-L52-55)

Per dependent claims 13-16: Claims 13-16 depend from claims 9-12 respectively and are directed to the use of Kalman filter methods in steady-state conditions. As admitted by applicants on page 6, line 6 of the specification, the use of Kalman filter methods is well known to those skilled in the art, and hence would have been knowingly selected as obvious choice for incorporation into the prediction model. Martin discloses a steady-state model of the process (Abstract, Fig. 6).

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Careful consideration should be given prior to applicant's response to this Office Action.

U.S. Patent 6,635,224 issued to Gui et al teaches on-line monitoring of process models.

*"Rugged Calibration for Process Control", P.J. Gemperline, Compana 95',
October 1995 teaches calibration of control processes.*

*"Using Qualitative Observations for Process Tuning and Control", C.J. Spanos et
al, IEEE Transactions on Semiconductor Manufacturing, April 1998 teaches calibration
of control processes.*

*"Mudcats Metrology Suite", Technical Documentation, Edison ESI, 2002 teaches
on-line calibration and quality prediction.*

*Any inquiry concerning this communication or earlier communications from the
examiner should be directed to Fred Ferris whose telephone number is 571-272-3778
and whose normal working hours are 8:30am to 5:00pm Monday to Friday. Any inquiry
of a general nature relating to the status of this application should be directed to the
group receptionist whose telephone number is 571-272-3700. If attempts to reach the
examiner by telephone are unsuccessful, the examiner's supervisor, Jean Homere can
be reached at 571-272-3780. The Official Fax Number is: (703) 872-9306*

Fred Ferris, Patent Examiner
Simulation and Emulation, Art Unit 2128
U.S. Patent and Trademark Office
Randolph Building, Room 5D19
401 Dulany Street
Alexandria, VA 22313
Phone: (571-272-3778)
Fred.Ferris@uspto.gov
December 15, 2004

Fred Ferris
AO 2128